

Mucosal Thickening of Maxillary Sinuses of CLP vs non-CLP patients.

K. Kula^{1*}, J. Starbuck¹, L. Hale¹, S. Tholpady², A. Ghoneima¹.

¹Department of Orthodontics and Oral Facial Genetics; ²Department of Plastic Surgery
Indiana University-Purdue University Indianapolis and Riley Hospital, Indianapolis, IN.

Funded by the IUPUI Signature Center Initiative: 3D Imaging of the Craniofacial Complex Center

Objectives: The objective of this retrospective radiographic study was to compare mucosal thickening of maxillary sinuses of patients with cleft lip and palate (CLP) vs. non-CLP.

Methods: Following IRB approval, three-dimensional cone beam computerized tomographs (CBCT; i-CAT) of children with unilateral CLP and children without CLP (age and gender matched; 8-14yoa; n=15ea) were selected randomly from pre-existing orthodontic records. Following reliability studies, one investigator segmented both sinuses from each CBCT using Dolphin-3D Imaging software. The sinuses were separated coronally into .4mm slices anterior-posteriorly. Bony sinuses and airspaces were outlined manually on each slice. Software calculated total sinus and airspace area. Areas were summed and multiplied by slice thickness to determine volume. Mucosal thickening was the difference between total sinus and airspace volumes. Percent mucosal thickening was calculated. Since no significant differences existed between cleft (left) and noncleft (right) sides of either patient group ($p>.05$), sinuses for each group were pooled (n=30 ea). Significant differences in total sinus, airspace, mucosal thickening volumes and % mucosal thickening were determined using paired t-tests, accepting $p\leq 0.05$ as significant. Principal Component Analysis (PCA) scatterplots were used to determine patterns of multivariate variation based on group, age, and sex. MANOVA was used to confirm PCA findings. Reliability was determined using Intraclass Correlations (ICC).

Results: Reliability was excellent ($ICC>0.99$). The CLP total sinus and airspace volume were significantly smaller and mucosal thickening and % mucosal thickening were significantly greater than non-CLP sinuses (all $p\leq .024$). PCA showed that 89.6% of sample variance was explained by PC axis 1 and 2 (group and age). Age group 8-9yrs showed more separation with 13-14yrs than with 10-12yrs. MANOVA confirmed a significant effect of sample ($p=.001$) and age ($p=.007$).

Conclusions: Children with unilateral CLP should be examined for potential problems related to sinus mucosal thickening.

Funding: IUPUI Signature Center Initiative - 3D Imaging Center/Jarabak Endowed Professorship